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15 August 2005

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Dear Sirs

International patent application No PCT/DK2004/000720  
Applicant: Bentle Products AG  
International classification: IPC 7 A01C7/04  
My ref: 79838 TN/kp

Referring to the International Search Report and Written Opinion of the International Searching Authority dated 27 January 2005 the European Patent Office is hereby requested to carry out a detailed preliminary examination according to the enclosed DEMAND.

The official fee for the examination should be deducted from my account as per the enclosed Fee Calculation Sheet.

Substitute pages 1, 1a, 2, 3, 3a, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14 and 15 on which the preliminary examination is to be based are submitted. The substitute pages include an amended set of claims (pages 13, 14, 15) and amended pages (1, 1a, 2-3, 3a, 4, 6-12) of the description adapted thereto as well as amended pages (1/6, 3/6, 4/6, 5/6, 6/6) of the formal drawings. The amendments carried out also appear from the enclosed draft. No new subject matter has been introduced by the amendments carried out.

The new claim 1 corresponds to the old claims 1 and 2 in amalgamated form with a few corrections being inserted by me.

The new claim 2 corresponds to the old claim 3.

The new claim 3 provided with a clarification corresponds to the old claim 4.

The new claims 4-7 correspond to the old claims 6-9.

The old claims 5 and 10-17 have been cancelled.

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Re Item V of the Written Opinion

The Examiner has cited EP-A- 0898867 as an X-citation against the old claims 1, 5 8 and 10-17. Said publication relates to a "Machine for transplanting seedlings". I agree that EP 0898867 is a pertinent citation; as a consequence claim 1 has been delimited by incorporation of the wording of the old claim 2 (the contents of the latter forming the characterising clause of the new claim 1). An argumentation against EP 0898867 has been inserted into the opening portion of the above-mentioned revised patent description.


WO 00/00009A and US-A-4829915 (both belonging to the applicant) and cited as A-publications only have been cited against the old claim 1. Since the wording of that claim now forms the opening portion of the new claim 1 I see no reason to argue in detail against these references. Should the Examiner however wish an argumentation I am of course prepared to give one.

As to the revision of the description of the present application please note that the old Figures 7 and 8 have been cancelled; therefore the old Figures 9-14 now appear as Figures 7-12.

In the new Figure 3 reference numerals 9a, 9b, 9a', 9b', 9, 16a, 16b have been inserted and in the new Figure 9 (old Figure 11) reference numerals 9a, 9b, 9a' and 9b' have been inserted.

Based on the above the Examining Division is hereby respectfully requested to accept the patentability of the present invention.

Yours faithfully  
CHAS. HUDE A/S

  
Tage Nørgaard  
Representative of the Applicant

Encs

Title: Machine for bedding out seed or plant tapes

Technical Field

- 5 The invention relates to an optionally self-propelling machine for bedding out seed or plant tapes, said machine being of the kind indicated in the introductory part of claim 1.

Background Art

- 10 A machine for bedding out seed tapes is known, said machine including a frame on which a bedding out unit is mounted, said bedding out unit being provided with a plough member. The plough member is associated with a conveyor including at least one continuous belt for a completely vertical lowering of so-called germinating units into a furrow. A germinating unit is a pocket filled with seed(s) and fertilizer, said ger-
- 15 minating unit being cut off the seed tape. The plough member presents a hollow interior and is rather wide, viz. approximately 85 mm, with the result that the furrow produced by said plough member is rather wide when said plough member is moved through the earth. The latter procedure is not completely satisfying as the germinating units have a tendency to fall over (turn over) in the furrow when they reach the bottom of said fur-
- 20 row. In addition, it is difficult to ensure that the compression of the earth in the furrow around the bedded out germinating unit is such that the structure of the earth, viz. the porosity, the lumps etc. thereof, remains the same as before the furrow was produced by the plough member.
- 25 EP published patent application No 0898867 A1 discloses a machine for bedding out seed or plant tapes and including a frame where at least one bedding out unit provided with a plough member is mounted on said frame. The machine further includes a carry-
- 30 ing pole to be connected to the front of a tractor frame. The plough member is associated with a conveyor including at least one continuous belt; the bedding out unit is provided with a supporting plate for at least one supply container for the seed or plant tape to be bedded out in a furrow produced by the plough member; the bedding out unit in-

cludes a plough member where the top webs of the plough are substantially horizontally projecting stabilising webs. The conveyor of said plough member is formed by a very inclined main conveyor with two conveyor belts arranged adjacent, but with a mutual, preferably adjustable distance to one another, said main conveyor extending over most of, preferably adjustable distance to one another, said main conveyor extending over most of, preferably substantially the entire length of the plough member. At least two pressure plates are mounted on the rear end of the machine for pressing down the earth around the seed or plant tape portion which has just been bedded out in the furrow. This machine is rather complicated because the two sets of conveyors more or less overlap each other (conf. particularly Figs.1 and 2 of that specification). Ad to this that the known machine is of a rather complicated construction.

#### Description of the Invention

The object of the invention is to provide a machine of the above type which reduces the possibilities of the seed or plant tape of falling over in the furrow, and which furthermore enhances a uniform compression of the earth in the furrow just after said seed or  
5 plant tape has been bedded out, said machine further being of a more simple construction than the prior machines.

The machine according to the invention is characterised in that a pre-conveyor is placed between the supporting plate of the supply container and the main conveyor, said pre-  
10 conveyor being adapted to run at a speed slightly slower than the

speed of the main conveyor, and where said pre-conveyor is mounted on a slide reciprocable in the longitudinal direction of the machine. As a result, it is possible, if necessary, to break the seed and plant tape so as to divide said tape into small units, optionally units including only one seed in each unit. Further this machine is of a more simple construction than the prior machines. Besides it should be noted that the seed or plant tape cannot fall over immediately after the placing thereof in the furrow because said furrow is relatively narrow. In addition, the pressure wheels ensure that the tape bedded out is compressed exactly so much that the structure, viz. the porosity, the lumps etc. of the earth adjacent the tape bedded out is substantially the same as before said tape was bedded out. The stabilising webs have the effect that the stability of the machine while running is very good, said stability also being enhanced by each bedding out unit being rather low. As the supporting plate is adjustable in height, it is possible in an easy manner to adjust the level of each supply container to the level of the front end of the pre-conveyor.

A pair of co-acting separation rollers may according to the invention be mounted between the main conveyor and the pre-conveyor, where preferably one or the other or both rollers include at least one separation rib, whereby the peripheral speed of said separation rollers can be substantially identical with the advancing speed of the main conveyor. When the seed tape includes many juxtaposed germinating units, the separated germinating unit can be parallelly displaced by the main conveyor in a downward direction and into the furrow while still kept in the vertical position and including a horizontal top edge. When the germinating unit is slightly inclined relative to vertical, said germinating unit continues to be inclined during the movement on the main conveyor.

Moreover according to the invention, a knife may be mounted between the main conveyor and the pre-conveyor for cutting the seed or plant tape into small tape pieces,

where each tape piece includes one or more seeds. The resulting separating procedure is very easy to carry out when it is desired to divide the seed tape up into germinating units.

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In addition, the main conveyor may according to the invention include two driving rollers and two tightening rollers arranged adjacent one another as well as two continuous conveyor belts extending around their respective free guiding webs of a profile guide-way



presenting a substantially U-shaped cross section. In this manner a particularly good retention of the seed or plant tape or of the germinating units is obtained while said seed or plant tape or said germinating units are slowly moved downwards into the furrow, the free distance between the two inner belt paths of the main conveyor being limited to a relatively small distance, viz. the distance between the two free guiding webs of said profile guideway minus twice the thickness of a continuous belt.

According to the invention, the bottom web of the U-shaped cross section of the profile guideway in the main conveyor may be hinged to the bottom web of the U-shaped cross section of the plough member at the rearmost end of said plough member. Thus, it is possible in a very simple manner to adjust the angle formed by the main conveyor with the longitudinal direction of the plough member.

Moreover, the conveyor belts of the continuous conveyors may according to the invention be made of plastics or textile presenting a high strength, and on the side facing the seed or plant tape or portions thereof these conveyor belts may present a rough surface, said side for instance being coated with emery or be provided with small friction-producing projections made of rubber or plastics. As a result, these conveyor belts can run for a long period of time without necessitating a replacement thereof. In addition, such conveyor belts present a good grip around the seed or plant tape or around the germinating units to be moved downwards into the furrow.

Finally according to the invention, two auxiliary rollers may be arranged at the rearmost end of the profile guideway, whereby the conveyor belts of the main conveyor can run freely about their respective auxiliary rollers. As a result, the friction between the individual conveyor belts and the free webs of the U-shaped cross section of the profile guideway has been reduced.



### Brief Description of the Drawings

The invention is explained in detail below with reference to the drawing, in which

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Fig. 1 is an inclined side view of an embodiment of a bedding out unit,

Fig. 2 is a top view of the embodiment of Fig. 1, where a portion of the frame and the carrying pole of the machine have only been indicated by means of a dotted line,

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Fig. 3 is a top view of an embodiment of the machine according to the invention provided with a pre-conveyor in addition to a main conveyor, and where a pair of alternative separation rollers appear,

15 Fig. 4 is a perspective view of a profile guideway,

Fig. 5 is a cross sectional view of a profile guideway,

Fig. 6 is a sectional view of the rearmost end of the plough member and showing how the profile guideway is hinged to said plough member,

- 5 Fig. 7 is a sectional view taken along the line VII-VII of Fig. 3 and showing how the pressure wheels can be slightly inclined relative to the longitudinal mid-plane of the furrow,

Fig. 8 is a cross sectional view of the plough member of the bedding out unit, the main  
10 conveyor being removed,

Fig. 9 is a top view of a portion of the main conveyor,

Fig. 10 is a perspective view of two separation rollers,

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Fig. 11 is a diagrammatic side view of the bedding out unit provided with a protecting shield, the drive means of the main conveyor and the supply container being omitted, and

- 20 Fig. 12 illustrates two co-acting driving gear wheels for advancing a seed or plant tape.

#### Best Mode for Carrying Out the Invention

The bedding out unit 2 shown in Fig. 1 forms part of a known machine 1 for bedding  
25 out seed or plant tapes 3 and optionally germinat-

ing units. As shown in Fig. 2, the machine 1 includes a frame 4, only a portion thereof being visible. If necessary, several bedding out units 2 can be arranged at regular intervals on the frame 4. This frame 4 is further provided with a carrying pole 29 for connecting the machine to the front of a tractor not shown. The machine can also be self-propelling.

The front end of the bedding out unit is indicated at 2a (Fig. 1) and the rearmost end at 2b. While running, the bedding out unit is moved from the right towards the left of Fig. 2.

The bedding out unit 2 includes a plough member 6 of a substantially U-shaped cross section, cf. Fig. 8. The upper end of the U is provided with substantially horizontally projecting stabilising webs 7a og 7b adapted to stabilise the plough member on the ground while the machine is pushed forwards by the tractor. The plough member is of a length L of at least approximately 30 cm and a width b measured across the U of 15 to 50 mm, preferably approximately 30 mm, cf. Fig. 8. A very inclined main conveyor is mounted on the plough member 6, cf. Fig. 1. This main conveyor includes two continuous conveyor belts 10 and 11, cf. Fig. 9, which are arranged adjacent one another and with an adjustable interspace a, cf. below. As shown in Fig. 1, the main conveyor 9 extends across a major portion of the length of the plough member 6, preferably across the entire length of said member. A supporting plate 13 is provided at the front end of the bedding out unit, said supporting plate 13 being adjustable with respect to height and/or angle. This supporting plate 13 is adapted to receive at least one supply container for seed or plant tapes or for germinating units 3 which can be pulled out of said container. A supply container is diagrammatically indicated at 14. The adjustment with respect to height and/or angle of the supporting plate 13 relative to the plough member can be carried out in a manner known per se. At least two pressure wheels 16a and 16b can be mounted on the rear end of the machine, preferably on the stabilising webs 7a and 7b, said pressure wheels pressing down the earth around the seed or plant tape portion just bedded out in a furrow 32.

Now in Fig. 3 an embodiment of the inventive machine is illustrated. As is clearly shown, a pre-conveyor 16 is inserted between the supporting plate 13 and the main conveyor 9. This pre-conveyor 16 is adapted to run at a speed slightly slower than the speed of the main conveyor 9. As shown, the pre-conveyor 16 is mounted on a slide 17 reciprocating in the longitudinal direction of the machine so as to render it possible to form separate germinating units in case of a break of the seed and plant tape. In order to promote the break, two co-acting separation rollers 18a, 18b can optionally be provided, cf. Figs. 3 and 10. Preferably one or the other or both separation rollers include a separation rib 19 assisting in producing a break in the seed and plant tape. The peripheral speed of the separation rollers correspond to the advancing speed of the main conveyor. As a result it is possible in a very simple manner to separate each germinating unit 3 from the seed or plant tape.

Alternatively, a knife known per se can be arranged at the position and instead of the two separation rollers 18a, 18b and be used for cutting the seed or plant tape into small tape pieces, viz. germinating units. Immediately upon the cutting off of a germinating unit, said unit is caught by the front end of the main conveyor 9.

As shown in Figs. 3 and 9, the main conveyor 9 can include two driving rollers 9a and 9b as well as tightening rollers 9a' and 9b'. A driving roller and a tightening roller are arranged relatively close to one another. The continuous belt 11 (Fig. 11) can pass around a driving roller 9a, pass a tightening roller 9a' and pass around an end roller 12a. Correspondingly, the continuous belt 10 can pass around a driving roller 9b, pass a tightening roller 9b' and pass around an end roller 12b. In connection with the outer path 11a and the inner path 11b of the continuous belt 11 it should be noted that these paths can be mutually separated by means of a free vertical guiding web 21a on a profile guideway 21, cf. Figs. 4, 5 and 11. Correspondingly, an outer belt path 10a and an inner belt path 10b of the continuous belt 10 can be separated by means of a guiding web 21b.

As illustrated in Fig. 6, the profile guideway 21 of the main conveyor can at the bottom web 21c of its U-shaped cross section be hinged 25 to the bottom web 7c of the U-shaped cross section of the plough member 6.

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The continuous conveyor belts 10 and 11 as well as the continuous belt of the pre-conveyor 16 can be made of plastics or textile presenting a high strength. The belts can present a rough surface on the side facing the seed or plant tape or portions thereof, said rough surface for instance being coated with emery or very fine sand or be provided  
10 with small friction-producing projections of rubber or plastics.

As mentioned in connection with Fig. 9, two rollers 12a and 12b can be mounted at the rearmost end of the main conveyor 9. These two rollers can optionally be removed and the ends of the webs 21a and 21b be rounded which, however, can involve a slightly in-  
15 creased wear and tear of the continuous belts.

The carrying pole 29 of the frame 4 can be adapted to be secured on a parallelogram suspension not shown on the front end of a tractor.

- 5 In connection with the two pressure wheels 16a and 16b at the rearmost end 2b of the plough member 6 it should be noted that said two pressure wheels can be rather wide and mounted in a slightly inclined manner relative to the longitudinal mid-plane of the furrow, cf. Fig. 7, with the result that said pressure wheels assist in a very reliable compression of the earth immediately after the bedding out of the seed tape.

It should also be noted that when the individual germinating unit, viz. plant pocket, is torn or cut off and moved forward by means of the main conveyor 9, then the angle relative to vertical of the germinating unit just before it enters said main conveyor 9 is maintained during the movement on said main conveyor 9. The latter situation has been indicated at 3" in Fig. 1 where the germinating unit was vertically positioned just before it entered the inclined main conveyor 9 and continues to be vertically positioned relative to said main conveyor 9. The machine allows a pulling out of seed or plant tapes or of germinating units from boxes arranged at various heights above one another.

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The adjustment with respect to height and/or angle of the supporting plate can be carried out automatically. The same applies to the adjustment of the angle  $\gamma$  of inclination of the main conveyor. The latter adjustment can for instance be carried out by means of a gear wheel-rack-connection where the gear wheel is driven by means of an electromotor.

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The invention may be modified in many ways without thereby deviating from the scope of the invention. Thus, the machine can be self-propelling. In the embodiment shown in Fig. 12, the tape 3 is pulled forwards by a conveyor in form of two co-acting gear wheels 19a', 19b' engaging the pockets of said tape 3, where each pocket includes one or more germinating units.

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## Claims

1. An optionally self-propelling machine for bedding out seed or plant tapes (3) and including a frame (4), where at least one bedding out unit (2) provided with a plough member (6) is mounted on said frame, said machine further including a carrying pole (29) to be connected to the front of a tractor frame (4), and where the plough member (6) is associated with a conveyor (9) including at least one continuous belt, as well as where the bedding out unit (2) is provided with a supporting plate (13) for at least one supply container (14) for the seed or plant tape (3) to be bedded out in a furrow (32) produced by the plough member (6), the bedding out unit (2) including a plough member (6) of a substantially U-shaped cross section, where the top webs of the U are substantially horizontally projecting stabilising webs (7a, 7b), and where said plough member (6) is of a length (L) of at least approximately 30 cm and a width (b) measured across the U of 15 to 50 mm, preferably approximately 30 mm, the conveyor of said plough member being formed by an inclined main conveyor (9) with two continuous conveyor belts (10, 11) arranged adjacent, but with a mutual, preferably adjustable distance (a) to one another, said main conveyor (9) extending over most of, preferably substantially the entire length (L) of the plough member (6), the supporting plate (13) being adjustable with respect to height and/or angle, and at least two pressure wheels (16a, 16b) being mounted on the rear end (2b) of the machine for pressing down the earth around the seed or plant tape portion which has just been bedded out in the furrow (32), **characterised in** that a pre-conveyor (16) is placed between the supporting plate (13) for the supply container (14) and the main conveyor (9), said pre-conveyor being adapted to run at a speed slightly slower than the speed of the main conveyor (9), and that said pre-conveyor (16) is mounted on a slide (17) reciprocable in the longitudinal direction of the machine.

2. Machine as claimed in claim 1, **characterised in** that a pair of co-acting separation rollers (18a, 18b) are mounted between the main conveyor (9) and the pre-

conveyor (16), where preferably one or the other or both separation rollers include at least one separation rib (19), and that the peripheral speed of the separation rollers correspond substantially to the advancing speed of the main conveyor.

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3. Machine as claimed in one or more of the claims 1 or 2, **characterised in** that a knife is mounted between the main conveyor (9) and the pre-conveyor (16) for cutting the seed or plant tape (3) into small tape pieces, where each tape piece includes one or more seeds.

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4. Machine as claimed in one or more of the claims 1 to 3, **characterised in** that the main conveyor (9) includes two driving rollers (9a, 9b) and two tightening rollers (9a', 9b') arranged adjacent one another, as well as two continuous conveyor belts (11, 10) extending around their respective free guiding webs (21a, 21b) of a profile guideway (21) presenting a substantially U-shaped cross section.

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5. Machine as claimed in one or more of the claims 1 to 4, **characterised in** that the profile guideway (21) of the conveyor (9) at the bottom web (21c) of its U-shaped cross section is hinged (25) to the bottom web (7c) of the U-shaped cross section of the plough member (6).

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6. Machine as claimed in one or more of the claims 1 to 5, **characterised in** that the conveyor belts (10, 11) of the continuous conveyors are made of plastics or textile presenting a high strength, and on the side facing the seed or plant tape or portions thereof these conveyor belts present a rough surface, said side for instance being coated with emery or be provided with small friction-producing projections made of rubber or plastics.

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7. Machine as claimed in one or more of the claims 1 to 6, **characterised in** that two auxiliary rollers (12a, 12b) are arranged at the rear end (2b) of the profile guideway (21), where the conveyor belts (10, 11) of the main conveyor (9'a) can run around their  
5 respective auxiliary rollers.

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